

PATENT APPLICATION
"VALVE FOR EVAPORATIVE SYSTEM"

Inventor
Rheinhardt J. Beverly
4150 W. Old Father Place
Tucson, Arizona 85741

Docket No. 9008d

October 16, 2003

VALVE FOR EVAPORATIVE SYSTEM

Background of the Invention:

This invention relates generally to evaporative cooling systems and more particularly to water valves used in such systems.

The true beginning of evaporative coolers is not known. It is known that cooling towers, where evaporating water causes the cool air to settle through the tower, have been used for a millennium or more.

In a cool tower, a collection of evaporative pads are soaked using a constantly flowing stream of water. As the water evaporates, the air is cooled and tends to settle. The falling cool air pulls more air through the water soaked pads, thereby creating a cooling cycle with a flow of chilled air.

A major problem associated with cool towers is the use and control of a constantly flowing water stream. The stream of water is ideally balanced to the evaporative rate, but, this is impossible due to the ever changing ambient conditions; therefore, the pads are either too dry or drip the excess water.

Modern evaporative cooling systems are extremely effective where the ambient air is relatively dry and where there is a good source of water and electricity. In a typical situation, water is pumped onto evaporative pads and an electric fan pulls air through the pads (where the ambient air is cooled) and then is forced into the house.

A catch basin is used to collect the excess water and a pump is used to re-cycle the water

1 over the evaporative pads.

2 In the case where there isn't any electricity though, a traditional evaporative cooling
3 system does not work.

4 It is clear that there is a need for an evaporative cooling system where electricity is not
5 readily available.

1 Summary of the Invention:

2 The invention creates a cooling system which utilizes a movable frame ideally positioned
3 within a duct. While the current discussion utilizes the present invention within a duct, the
4 invention is not so limited and may be used in a variety of locations including, but limited to,
5 attics where the attic air is to be cooled using evaporation.

6 Within the invention, the moveable frame has an evaporative pad. The evaporative pad
7 is any of those well known in the art. The evaporative pad is configured to absorb water and
8 allow a flow of air to pass through the pad, thereby allowing the water within the pad to
9 evaporate. In the preferred embodiment, the evaporative pad is placed in a horizontal position.

10 A nozzle is positioned to spray water onto the evaporative pad. In some embodiments,
11 the nozzle is secured to the frame and moves with the movement of the frame/evaporative pad.
12 In other embodiments, the nozzle is positioned to address the evaporative pad when the frame is
13 in an upper position.

14 As the nozzle sprays water onto the evaporative pad, the evaporative pad absorbs the
15 water and the weight of the water causes the frame to move to a lower position. This movement
16 of the frame causes a valve to shut off the water flowing to the nozzle.

17 The valve is secured at a location separate from the frame/evaporative pad so that there
18 is relative movement between the valve and the frame. A rod or other such mechanism connects
19 the frame to the valve and the relative movement between the frame and valve is communicated
20 by the rod so that the valve's operation is controlled thereby.

21 Once the frame/evaporative pad is in the lower position and water is no longer being
22 applied via the nozzle, water within the evaporative pad evaporates; thereby reducing the weight

1 of the frame. The frame rises to an upper position; thereby forcing the valve to open and water
2 is again sent through the nozzle to the evaporative pad; the cycle repeats itself.

3 The invention, together with various embodiments thereof, will be more clearly
4 explained by the accompanying drawings and the following description thereof.

1 Drawings in Brief:

2 Figures 1A and 1B show the preferred embodiment in two different states: water valve
3 open; and, water valve closed.

4 Figures 2A and 2B illustrate an alternative embodiment of the invention showing the use
5 of a weighted arm used to adjust movement of the absorption pad.

6 Figures 3A and 3B are front and side views of an embodiment of the invention in which
7 the valve also serves as a support for the absorbent pad.

8 Figure 4 illustrates the preferred embodiment of the frame and absorbent material
9 illustrating the “leak proof” properties of the preferred frame.

1 Drawings in Detail:

2 Figures 1A and 1B show the preferred embodiment in two different states: water valve
3 open; and, water valve closed.

4 Figure 1A illustrates the state where water valve 12A is open allowing water 11 to flow
5 through nozzle 13. Water valve 12A is operated by lever 18A, shown in a raised position in
6 figure 1A. Lever 18A is normally held in a closed position by being spring loaded (not shown).
7 Lever 18A is moved to the “open” position by frame 15A, as frame 15A is forced upwards
8 within duct 10 by springs 16A.

9 As the water is sprayed by nozzle 13 onto absorbent material 17, two reactions occur.
10 The first is the cooling of the air surrounding the moistened absorbent material 17; as the air
11 cools, it falls pulling more ambient air 14 into the duct.

12 The second reaction that occurs is the creation of more weight (from the water) on frame
13 15A, thereby causing springs 16A to be compressed to that shown as springs 16B of figure 1B;
14 thereby lowering frame 15A to the state shown in figure 1B.

15 As shown in figure 1B, when frame 15B is in its lowest position, lever arm 18B closes
16 water valve 12B so that no water is emitted from nozzle 13. With the absorbent material still
17 moistened, the cooling process continues on ambient air 14. When sufficient water has been
18 evaporated, thereby reducing the weight within frame 15B, frame 15B starts to rise to the state
19 shown by frame 15A of figure 1A, so that the water valve 12A is opened again to repeat the
20 cycle.

21 In this manner, the pads are kept wet without the use of any electrical pumps.

22 Figures 2A and 2B illustrate an alternative embodiment of the invention showing the use

1 of a weighted arm used to adjust the movement of the absorption pad.

2 In this embodiment, support 21 is pivotally secured to pivot arm 7 which in turn is
3 secured to attic rafter 20. This arrangement assures that pivot arm 7 and rafter 20 remain in a
4 fixed position leaving support 21 to rotate thereupon.

5 Frame 27, containing the absorbent material, is secured to one end of support 21. On the
6 opposing end of support 21 is adjustment weight 22 which is moved on threads 23 so that a
7 proper "balance" is obtained.

8 In this context, a "balance" is when support 21 is in the position shown in figure 2A
9 when the absorbent material within frame 27 is substantially dry; and is in the position shown in
10 figure 2B when the absorbent material is properly moistened.

11 The application of water when support is in the position shown in figure 2A is through
12 the movement of valve arm 25 which is connected via connecting rod 26 to the end of support
13 21. In this manner, when support 21 is in the position shown in figure 2A, valve arm 25 is
14 pressed downward, thereby opening water valve 24 permit the water to flow through flexible
15 tubing 9 to nozzle 28, thereby dispenses water onto the absorbent material within frame 27.

16 Ambient air 29A is drawn through (through the cooling of the air) the absorbent material
17 to exit as cooled air.

18 When the absorbent material is sufficient moistened, support 21 moves to the position
19 shown in figure 2B. Connecting rod 26 pulls valve arm 25 upward to shut off valve 24, thereby
20 denying any further water to frame 27 and its attendant absorbent material.

21 Ambient air 29A continues to be drawn through frame 27, thereby drying the absorbent
22 material and reducing its overall weight. When the absorbent material is sufficient dry, support

21 again moves from the position shown in figure 2B to that shown in figure 2A and the water valve 24 is again opened.

In this manner, the absorbent material within frame 27 is continuously moistened to permit the evaporative cooling of the attic region of the house.

Figures 3A and 3B are front and side views of an embodiment of the invention in which the valve also serves as a support for the absorbent pad.

Water valve 32 is supported by loop 30B which is secured to eye bolt 30A. Eye bolt 30A is screwed into a beam (not shown). Hose 31 supplies water to water valve 32.

Slide mechanism 33 moves in an upward/downward motion indicated by arrows 34. Springs (not shown, enclosed within valve 32) provides tension to keep slide 33 in an upward condition. In the upward condition, valve 32 is "open", allowing water to flow through nozzles 35 which emit water onto frame 36 with absorbent pads.

As the absorbent pads become heavier, due to the water being deposited, slide 33 moves into the downward position and the water flow is stopped.

As before, when the water evaporates sufficiently from the absorbent pads, the slide mechanism returns to the upward condition so that the cycle is able to repeat.

Figure 4 illustrates the preferred embodiment of the frame and absorbent material illustrating the "leak proof" properties of the frame.

Frame 41 holds absorbent material 43 such that water from nozzle 40 is directed thereto. Baffles 44A and 44B are used to direct excess water 45 to collection tank 46 which passes the collected water through to waste water 47.

The cooled air is able to easily pass between baffles 44a and 44B and then exit the

1 bottom of frame 41 via openings 42.

2 It is clear the present invention creates a highly improved and versatile evaporative
3 cooling mechanism.